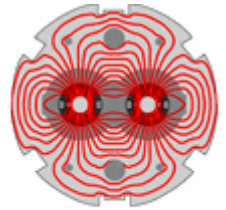


LHC Remote Operations Center

Erik Gottschalk
Fermilab

Introduction

We are developing plans for a joint CMS and LHC remote operations center on the first floor of Fermilab's Wilson Hall.

We are looking for feedback and help:

- What functionality and physical aspects are important to you?
- What are the needs of individual subdetector groups?
- What is the model for remote operations for CMS?
- How will remote shift activities be organized?

Send feedback to erik@fnal.gov, maeshima@fnal.gov, mcbride@fnal.gov or join us at the weekly ROC meeting on Tuesday's at 4:00 pm (CST)

Additional information is available:

http://cd-amr.fnal.gov/remop/remop.html (web page)

http://twiki.cern.ch/twiki/bin/view/CMS/LHCatFNAL (wiki page)

Overview

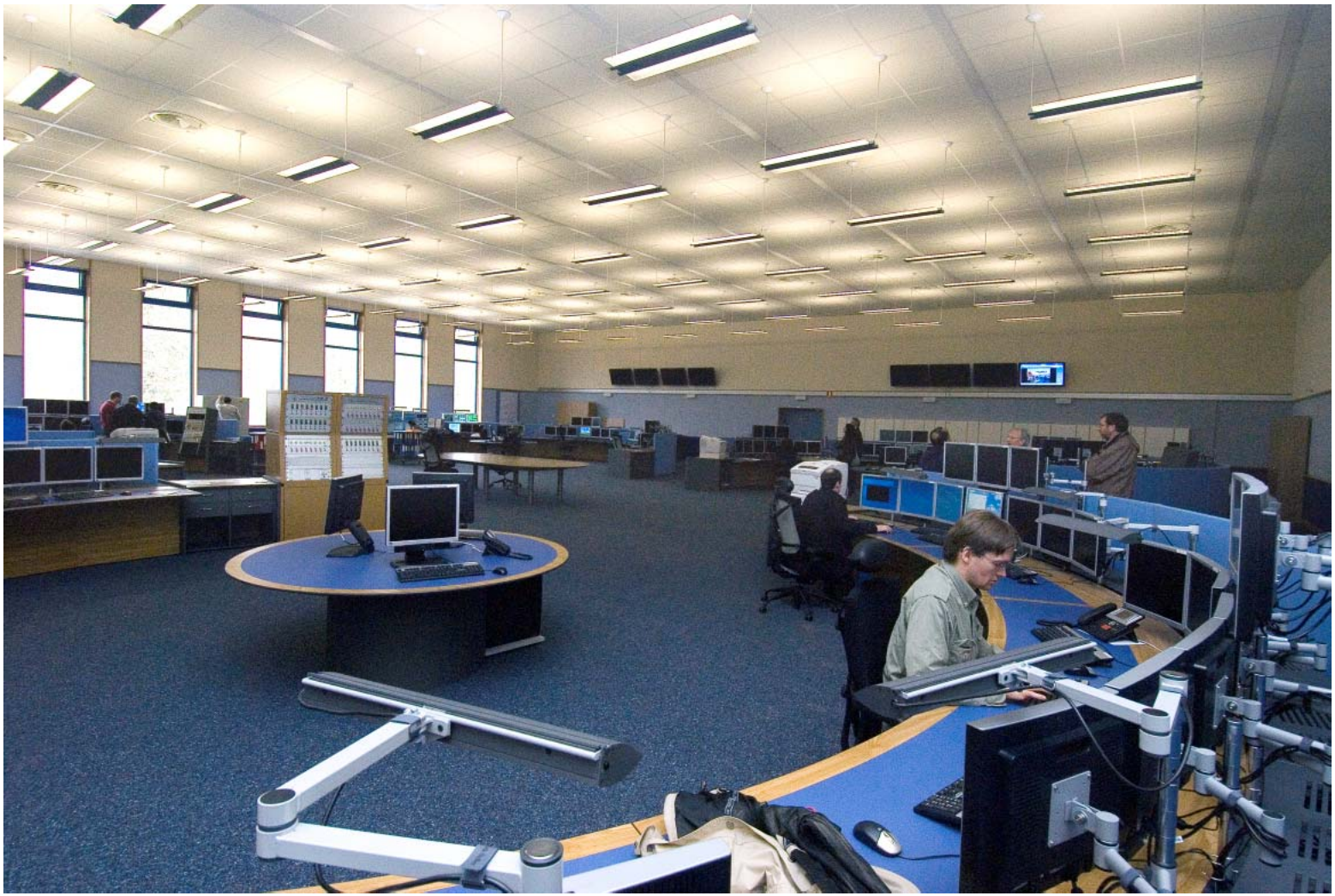
- CMS and LHC control rooms at CERN
- Remote operations centers
- Plans for ROC & LHC@FNAL
- 3D model of LHC@FNAL
- Summary

Control Rooms at CERN

- Temporary **CMS** control room for MTCC ("green barracks")
- **CMS** control room at Point 5
  - Under construction
  - Small control room, low ceiling
  - ~13 km from CERN (Meyrin)
- New **LHC** control room – **C**ERN **C**ontrol **C**entre

  The CCC combines all of the control rooms for the accelerators, cryogenic systems and technical infrastructure into one room. The CCC began operations on February 1st, 2006.

CERN Control Centre



Remote Operation of CMS

LARP

- How will CMS operate?
- This was discussed during CPT Week at CERN, Jan.-Feb. 2006.

Friday 03 February 2006

CCAR Meeting (2006-02-03 08:30->12:30)		Chairperson: Paris Sphicas Room: 40-S2-A01
08:30	Introduction (15') (transparencies)	Paris
08:45	Current plans for CCAR (25') (more information)	Hans Hoffmann
09:10	Infrastructure for CCAR (30') (more information)	Werner Jank
09:40	VRVS: status and future (15') (more information)	Philip Galvez
09:55	Monitoring: Monalisa (15') (transparencies)	Iosif Legrand
10:10	Break	
10:40	Experience from CDF II Detector Operations (20') (more information)	Jeff Spalding
11:00	CDF Offline Operations (20') (transparencies)	Rob Harris
11:20	Babar offline operations (20') (transparencies)	Peter Elmer
11:40	FNAL Remote Control Room (20') (more information)	Kaori Maeshima

Remote Operation of CMS

Why does CMS need remote operations at CERN?

- SX5 is ~13 km from Meyrin
- SX5 lacks “infrastructure” available at Meyrin
- CMS control room, currently under construction, is “tiny”
- CMS control room has a low ceiling
- SX5 does not have large and small meeting rooms that are necessary for daily/weekly meetings and expert space

Paris Sphicas:

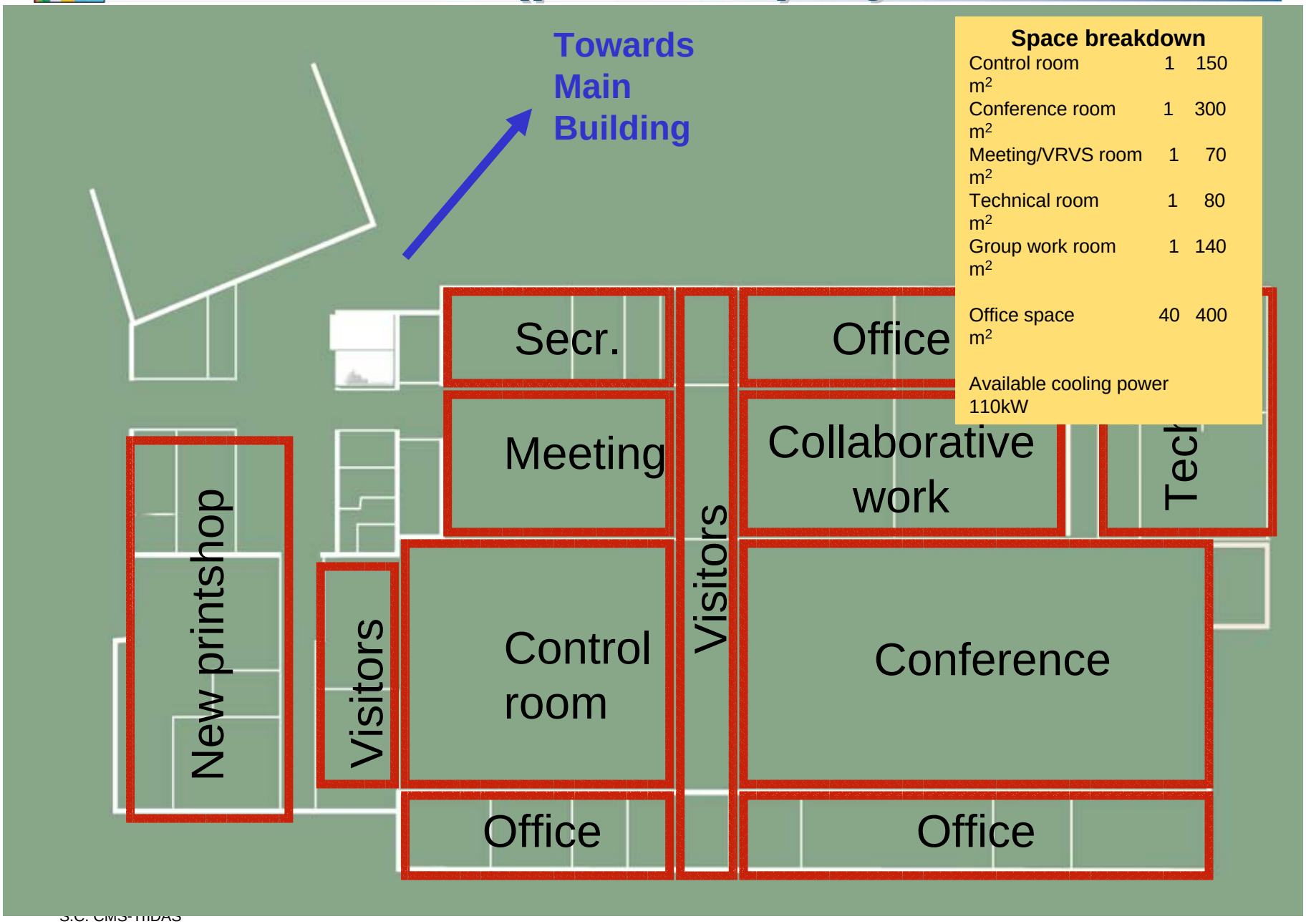
Asymptotically, at sufficiently long times after startup, we will run CMS remotely

- This is not a question of whether this will happen – it’s a question of when.

Remote Operations Centers

- CCAR (planned for Meyrin)
  - Future remote operations (and control) center for CMS
  - Described as the “heartbeat” of CMS at CERN
- ROC and LHC@FNAL
  - Remote operations center for CMS commissioning and operations, and LHC beam commissioning and operations

CCAR (possible) layout



Space breakdown

Control room	1	150 m^2
Conference room	1	300 m^2
Meeting/VRVS room	1	70 m^2
Technical room	1	80 m^2
Group work room	1	140 m^2
Office space	40	400 m^2

Available cooling power 110kW

Remote Operations for US-CMS

1) Dedicated facility to support both CMS and LHC commissioning and operations.
   - Remote shifts for CMS

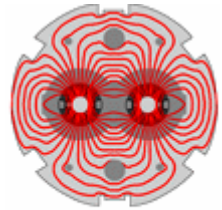
2) Facilitate communication with CMS and LHC control rooms.
   - Call center for US-CMS collaborators to access information about CMS and the LHC accelerator.
   - Introduce collaboration tools to improve communication

3) Take advantage of a unique opportunity to have detector and accelerator experts working together to solve problems.

Goals for ROC & LHC@FNAL

- Participate in CMS and LHC shifts from the U.S.
- Participate in CMS and LHC data monitoring and analysis
- Monitor US-CMS online and offline computing
- Develop and test new monitoring capabilities
- Provide access to data, data summaries, and analysis results
- Provide training in preparation for shift activities at CERN
- Assist in establishing communications between accelerator and detector experts in North America and CERN

LHC@FNAL Task Force



- Erik Gottschalk – Chair (FNAL-PPD)
- Kurt Biery (FNAL-CD)
- Suzanne Gysin* (FNAL-CD)
- Elvin Harms* (FNAL-AD)
- Shuichi Kunori (U. of Maryland)
- Mike Lamm* (FNAL-TD)
- Mike Lamont* (CERN-AB)
- Kaori Maeshima (FNAL-PPD)
- Patty McBride (FNAL-CD)
- Elliott McCrory* (FNAL-AD)
- Andris Skuja (U. of Maryland)
- Jean Slaughter* (FNAL-AD)
- Al Thomas (FNAL-CD)

* Accelerator Subgroup

The LHC@FNAL task force had its last meeting on March 29, 2006.

Planning for LHC@FNAL

- The LHC@FNAL task force developed a plan for CMS remote operations based on discussions with members of CDF, D0, CMS HCAL and trackers groups.
- We worked with CMS and US-CMS management, as well as members of LARP (LHC Accelerator Research Program) and LARP management at all steps in the process.
- A requirements document for LHC@FNAL was prepared and reviewed last summer.
- We visited 9 sites (e.g. Hubble, NIF, ESOC) to find out how other projects do remote operations.
- The goal is to have LHC@FNAL ready before the start of beam (end of 2006).

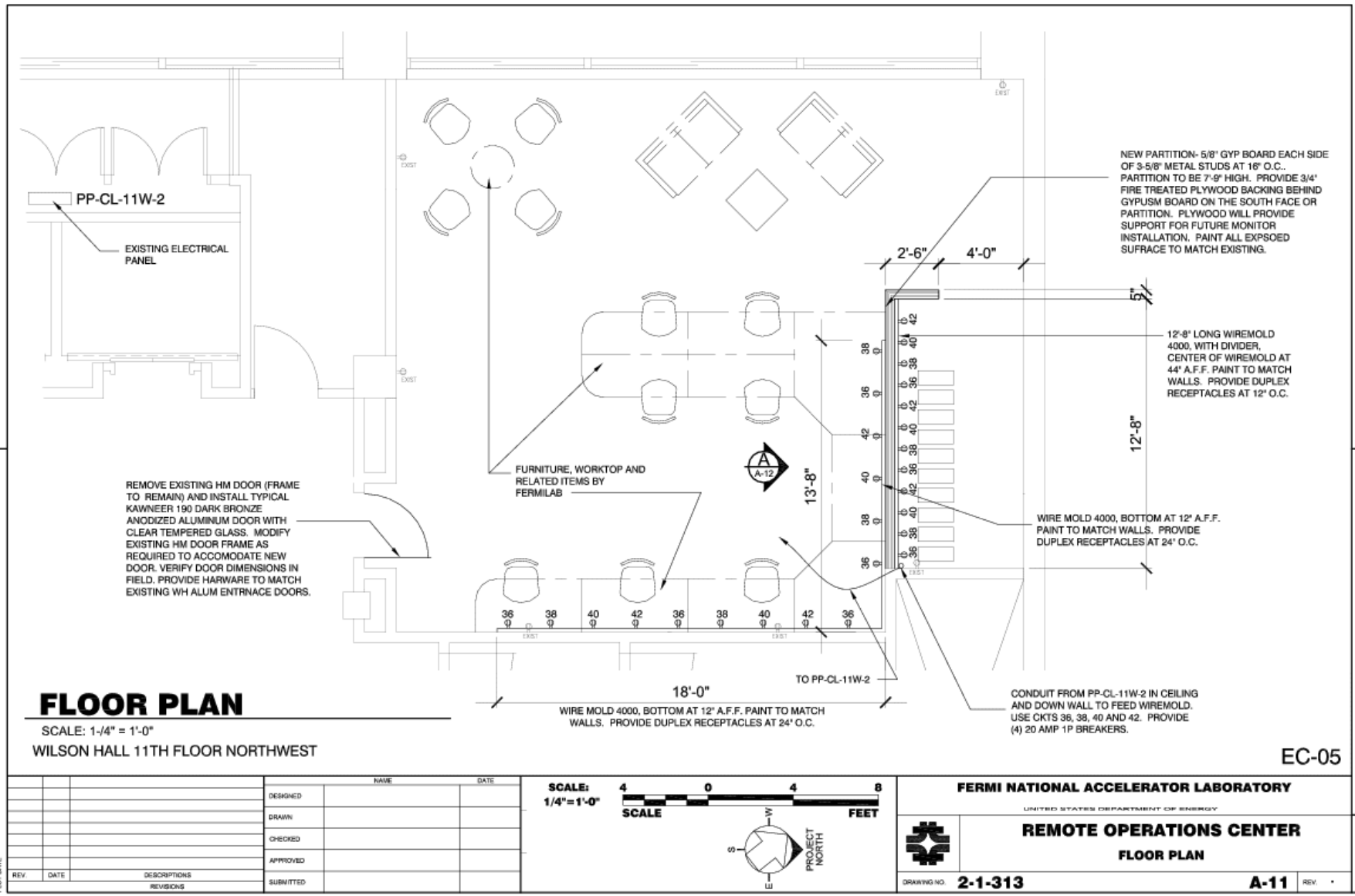
ROC & LHC@FNAL Timetable

- ROC renovation started – June 2005
- LHC@FNAL Requirements Review – July 2005
- Preliminary requirements document completed – July 2005
- ROC renovation completed – September 2005
- Developed LHC@FNAL plan – Fall 2005
- WBS presented to FNAL Directorate – Feb. 2006
- Requirements document completed – March 2006
- Engineering design start – March 2006

➢ Looking for feedback now!

- LHC@FNAL (Phase 1) construction start – May 2006
- LHC@FNAL (Phase 1) construction completed – October 2006
- Move ROC operations to LHC@FNAL – Spring 2007

WH11NW – ROC



FLOOR PLAN

SCALE: 1-/4" = 1'-0"

WILSON HALL 11TH FLOOR NORTHWEST

EC-05

REV.	DATE	DESCRIPTIONS / REVISIONS

	NAME	DATE
DESIGNED		
DRAWN		
CHECKED		
APPROVED		
SUBMITTED		

SCALE: 1/4"=1'-0"

4 0 4 8

SCALE FEET

PROJECT NORTH

FERMI NATIONAL ACCELERATOR LABORATORY

UNITED STATES DEPARTMENT OF ENERGY

REMOTE OPERATIONS CENTER

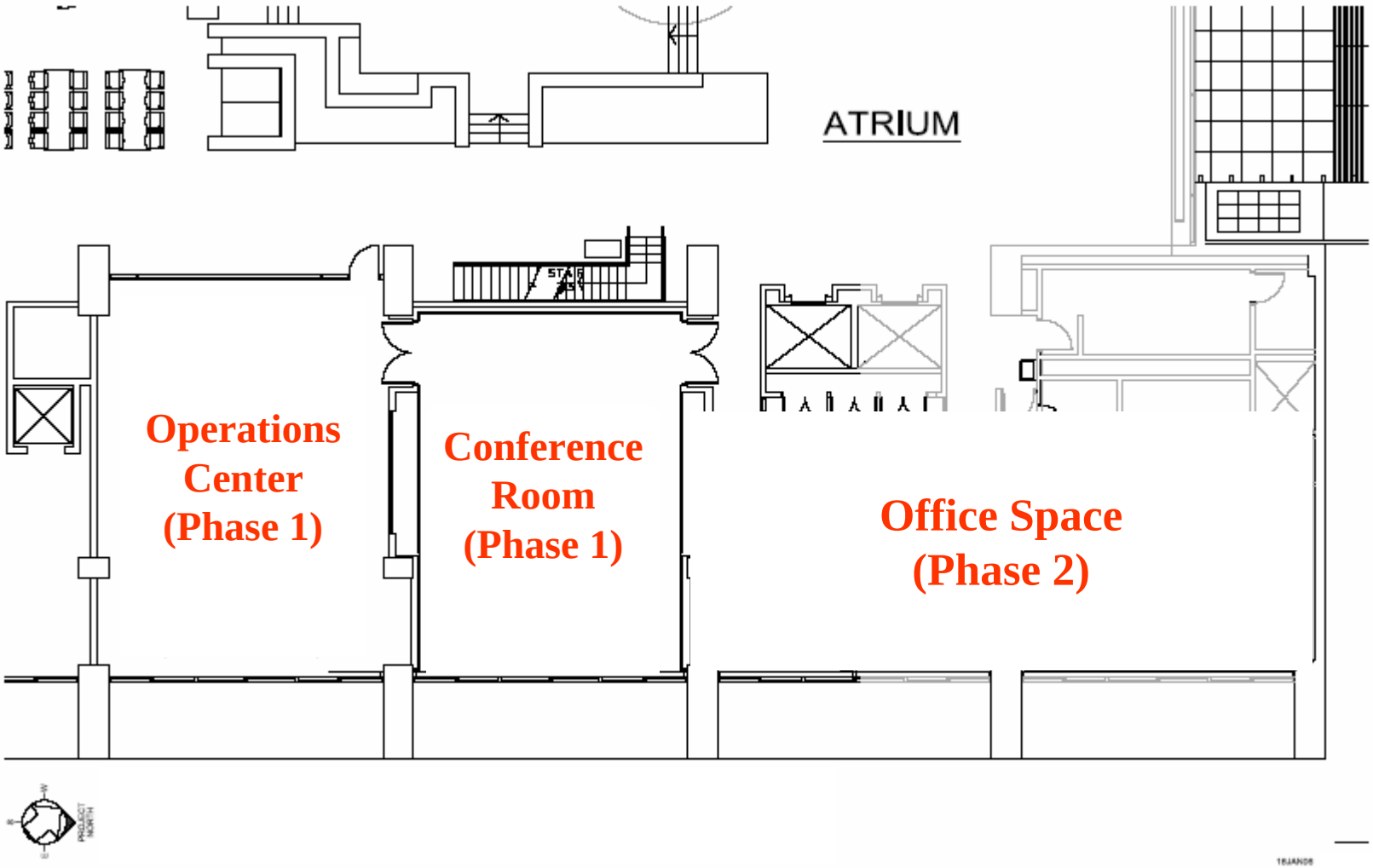
FLOOR PLAN

DRAWING NO. 2-1-313 A-11 REV. -

14 JUNE, 2005

PLOT DATE

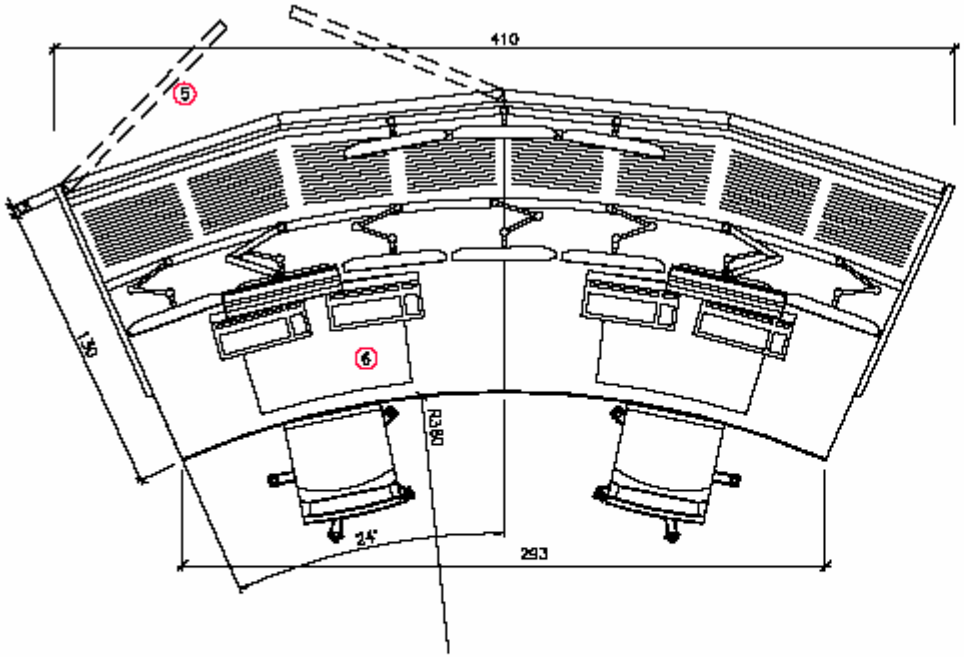
New Location & Layout

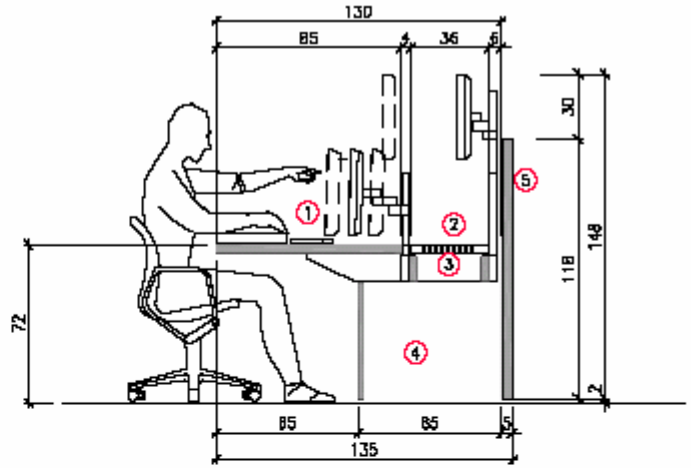



LHC @
FNAL


LHC @
FNAL

Consoles





① Work top
② Monitor top
③ Cable channel
④ Installation room
⑤ Acoustic screen doors
⑥ Insert
⑦ Light–top

Possible CMS Activities

Operations Center:

- Online shifts (DQM, trigger monitoring)
- Offline shifts (data processing, data distribution, GRID)
- Miscellaneous (shift training, DB maintenance)
- Call center for US-CMS

Conference Room (integrated with Ops. Center):

- Daily & weekly meetings

Office Space:

- Two small meeting rooms (3 – 5 people each)
- Expert space
- Rest area for shifters

Summary

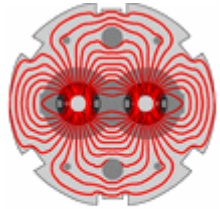
We are developing plans for a joint CMS and LHC remote operations center, and are looking for feedback and help.

If you have questions or suggestions contact:

- erik@fnal.gov (Erik Gottschalk)
- maeshima@fnal.gov (Kaori Maeshima)
- mcbride@fnal.gov (Patty McBride)

Come to our discussion session on LHC Remote Operations!!

Additional Slides



LARP

LHC@FNAL Current Status

- LHC@FNAL layout endorsed by Fermilab Director
- Funding secured
- Conceptual Design Report completed and reviewed
- Project Execution Plan written
- Project Managers
  - Elvin Harms (FNAL-AD) – construction
  - Erik Gottschalk (FNAL-PPD) – consoles
- Weekly meetings to prepare construction drawings
- Presentation to US-CMS Collaboration (early April)
- Presentation to LHC Accelerator Research Program (LARP) at its collaboration meeting (late April)
- Construction complete by end of FY06

Assumptions

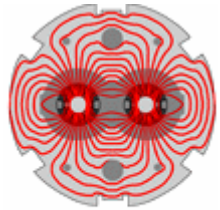
For CMS

- CMS will have a shift schedule, a run plan, and a protocol that defines responsibilities and roles of shift personnel. We assume that a shift leader is responsible for CMS shift activities.
- LHC@FNAL will have shift operators who will be able to assist US-CMS collaborators with CMS activities during commissioning and operations.
- LHC@FNAL will participate in CMS shifts. Neither the duration nor the frequency of the LHC@FNAL shifts has been determined.
- The CMS Collaboration will have a protocol for access to the CMS control system (PVSS), and a policy for how access to the control system will vary depending on the physical location of an individual user.
- The CMS Collaboration will have a policy that defines how DAQ resources are allocated. This includes allocation of DAQ resources to various detector groups for calibration and testing.
- The CMS Collaboration will have a protocol that defines how on-demand video conferencing will be used in CMS control rooms and LHC@FNAL.
- The CMS Collaboration will provide web access to electronic logbook and monitoring information to collaborators worldwide
- The CMS Collaboration will maintain a *call tree* that lists on-call experts worldwide for each CMS subsystem during commissioning and operations

For both CMS & LHC

- LHC@FNAL will comply with all CERN and Fermilab safety and security standards.

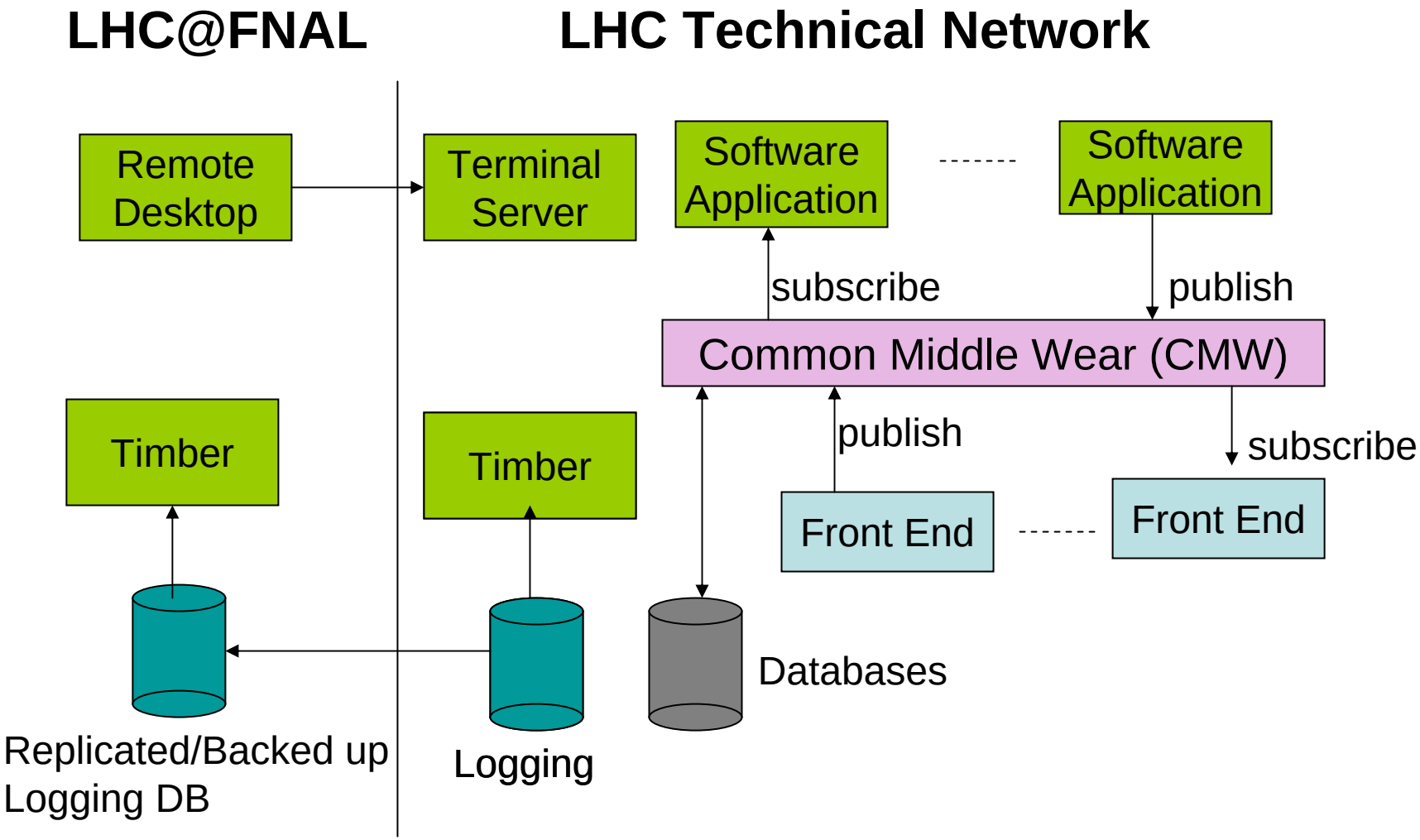
Site Visits



LARP

- **Technology Research, Education, and Commercialization Center (TRECC) – West Chicago, Illinois** (Aug. 25, 2005)
- **Gemini Project remote control room – Hilo, Hawaii** (Sept. 20, 2005)
  - http://docdb.fnal.gov/CMS-public/DocDB/ShowDocument?docid=425
- **Jefferson Lab control room – Newport News, Virginia** (Sept. 27, 2005)
  - http://docdb.fnal.gov/CMS-public/DocDB/ShowDocument?docid=505
- **Hubble Space Telescope & STScI – Baltimore, Maryland** (Oct. 25, 2005)
- **National Ignition Facility – Livermore, California** (Oct. 27, 2005)
  - http://docdb.fnal.gov/CMS-public/DocDB/ShowDocument?docid=532
- **General Atomics – San Diego, California** (Oct. 28, 2005)
- **Spallation Neutron Source – Oak Ridge, Tennessee** (Nov. 15, 2005)
  - http://docdb.fnal.gov/CMS-public/DocDB/ShowDocument?docid=570
- **Advanced Photon Source – Argonne, Illinois** (Nov. 17, 2005)
- **European Space Operations Centre – Darmstadt, Germany** (Dec. 7, 2005)
  - http://docdb.fnal.gov/CMS-public/DocDB/ShowDocument?docid=622

Baseline for LHC Remote Access



Preferred Model for Remote Access